



2. Weekly Report (17.07- 23.07. 2023)

In the early morning on July 19, the vessel arrived in the Italian exclusively economic zone (EEZ) where the multibeam and sediment echo sounders were switched on and a probe was lowered through the water column to acquire a sound velocity profile, which is used to calibrate the echo sounder data. Further sound velocity profiles were collected during this week whenever we arrived in a new area, where the properties of the water masses and their stratification might have changed.

On the morning of July 6, we arrived at the main working area of this expedition, the Sicilian Channel. Within the first week of the expedition our work focused on its northernmost part with the Sicilian shoreline often visible in the distant horizon. During the past days, mapping surveys alternated with dredge hauls. In addition to recording the bathymetric and sediment echo sounder data during the mapping, we deployed a magnetometer that is towed at 300 m distance behind the ship to minimize the influence of the ship's metallic body on the magnetic field records. Notable deviations of the recorded magnetic field data are observed when passing over volcanic structures, which dot the surrounding carbonate sediments, making up about 99% of the seafloor in the Sicilian Channel. The anomalies in the magnetic field are therefore highly valuable to find and identify the often very small igneous centers (“needle in a haystack”).

The shallow water depths (20-300 m) in the northern Sicilian Channel pose a particular challenge for the dredging operations. In addition, the identified volcanic structures can have very shallow slopes, so that they can hardly be called a “seamount”. Therefore, many dredge hauls return mainly carbonate material. In many cases, however, volcanic rocks, suitable for geochemical applications, were also obtained.

A scientific highlight of this week was our work on Graham Bank, located between Sicily and Pantelleria Island. Graham Bank consists of two prominent cones with flat tops, the southernmost of which rises up to 9 m below sea level. This shoal, well known to local fishermen, represents the site of the most recent volcanic eruption in the working area: In July 1831, a volcanic outburst produced a short-lived island (“Ferdinanda Island”) that was washed away by wave erosion a few months thereafter. According to historical records, such emergence/disappearance occurred already four times in this area since 300 BC. During the few months of its last appearance, four countries (the United Kingdom, Italy, France and Spain) claimed the island and disputed over its sovereignty.

In 2012, gas bubbles rising was observed at the NE flank of Graham Bank in 155 m water depth during a ROV dive conducted by the National Geophysical and Vulcanological Institute of Italy. We were able to confirm that this venting is still active by recording distinct flares, rising from the seafloor at this site, in the water column recordings of the multibeam echo sounder (Fig. 1). Subsequent dredging in this area

retrieved several small pipe structures composed of fine-grained volcanoclastic material, interpreted as vent chimneys, possibly cemented by authigenic mineral precipitations (Fig. 2).

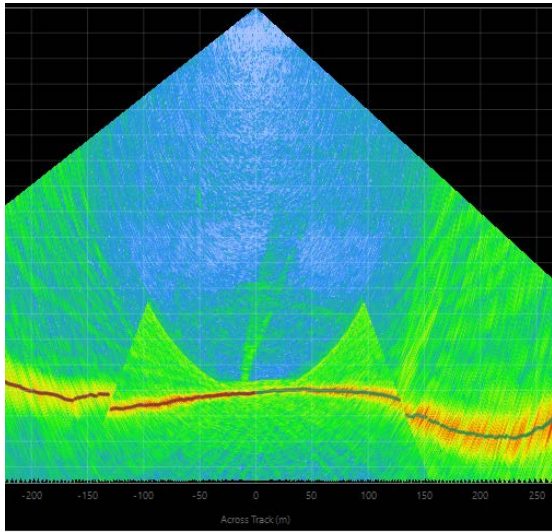


Fig. 1: 30 m high flare (center of picture) observed in the water column data of the KONGSBERG EM710 multibeam echo sounder, on the NE flank of Graham Bank, presumably caused by gas bubbles rising.



Fig.2. Scientist Kerys Meredith from the University of Birmingham (UK) holding a chimney structure, dredged from near the active venting site of Graham Bank (see Fig. 1) (Photo: J. Geldmacher).

Everyone on board is well. The crew is ensuring in their usual friendly and professional way that the scientific operations and instrument deployments run smoothly. We all enjoy the (hot) sunny weather and the calm sea.

For the M191 scientific party,

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